

SPECIFICATION

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WATER MISTING UMBRELLA

Cross Reference To Related Applications

This application claims the benefit of U.S. Provisional Patent Application No. 60/309,860, filed August 3, 2001.

Background of Invention

Field of the Invention

[0001] The present invention related to evaporative cooling equipment and, more particularly, to an evaporative cooler for cooling individuals using a portable liquid misting device. More specifically, the present invention relates to a misting system mounted within a conventionally collapsible, hand carried sun umbrella.

Description of the Prior Art

[0002] The western portion of the United States, extending from West Texas to the California coastal range, is characterized by warm to hot summers, with generally low relative humidity. This climate has made the west ideal for evaporative or "swamp" coolers, which release water into the air to obtain a 10 to 20 degree reduction in air temperature.

[0003] Swamp coolers use considerably less power than compressive refrigeration units, and may be obtained in sizes ranging from the portable to units designed to cool individuals, such as spectators at summer sporting events, to massive, permanently mounted chillers for cooling buildings as large as aircraft hangers. As long as the air remains dry, such coolers can provide relief from the hottest days of summer at a fraction of the power requirements of refrigeration coolers.

[0004] Evaporative coolers typically employ a fan that is used to blow air through a wet, porous media. In a variation on that principal, the fans are eliminated and nozzles

spray water droplets out into the atmosphere, permitting the general air circulation to cool the area surrounding the misting nozzles. These devices have become known as "mistifiers," and were originally located in commercial areas such as outdoor restaurants and stadium event seating. Less costly pumping units have made "mistifiers" available to homeowners for cooling covered outdoor patio areas.

[0005] More recently, personal mistifiers have been provided that consist of a portable water carrier connected to one or more nozzles through flexible tubing. A hand-operated pump is provided to pressurize the container, and a control valve enables the user to cause water to flow from the tank and out through the nozzle. Since the water is under pressure as it leaves the nozzle, it is converted into a fine spray that is intended to evaporate and cool the air surrounding the user. Just as the original mistifiers were located in shaded areas, a need exists to combine the cooling benefits of evaporating water droplets with a means to block the radiant energy of the sun during the hot days of summer.

Summary of Invention

[0006] It is an object of the present invention to provide a portable evaporative cooling system for use by individuals that combines the benefits of shading the user(s) from direct solar radiation, while also lowering the temperature of the immediate environment through evaporation. In this regard, a conventional umbrella is provided with several misting or spray nozzles that are attached and arranged on the underside of the canopy to create arrays of spray underneath the umbrella.

[0007] Depending upon humidity levels, by rotating the umbrella a user can vary the nature of cooling received, whether primarily by impact of liquid water or as a result of evaporative cooling in the user's immediate area. Water is transported to the nozzles through tubing that may be routed up through the inside of the umbrella shank. Storage of the water desirably may be using portable containers that permit pressurization and a controllable plastic tubing connection.

[0008] In use, after filling the water container, it is pressurized using a manual pump that is either an integral part of the container or an easy add-on to the container feed opening. A flexible tube connects the container to the umbrella supply tubing, with a

control valve regulating the flow of water through this connection. When the valve is opened, permitting pressurized water to flow out of the container, the umbrella tubing directs the water up the shank and out through the nozzles mounted under the canopy. The nozzles can be directed to create a desired spray pattern, with simple rotation of the umbrella all that is required by the user to alter the effects of this spray pattern with respect to the user whether a physical wetting is desired or merely cooling as a result of the evaporation of an adjacent liquid spray.

[0009] These objects, as well as other objects and advantages of the present invention will become readily apparent upon review of the description of a non-limiting illustrative embodiment and the accompanying drawings.

Brief Description of Drawings

[0010] Figure 1 is a perspective view, with portions broken away, showing a misting umbrella in accordance with the present invention; Figure 2 is a cross-sectional view, taken along line 2-2 in Figure 1, showing the manner of nozzle within the misting umbrella in accordance with the present invention; Figure 2A is an enlarged cross-sectional view of the central umbrella canopy of Figure 2, showing a connection between the water supply tubing and the distributional tubing in accordance with the present invention; and Figure 3 is a partial perspective view, with portions broken away, showing the water distributional tubing beneath the umbrella canopy in accordance with the present invention.

Detailed Description

[0011] Reference is now made to the drawings, wherein like numerals refer to like parts throughout. A misting umbrella 10 is shown in Figure 1 in an opened configuration, with a water reservoir 14 connected to the misting umbrella 10 through a length of water supply tubing 16. A quick connect valve 18 permits fluid communication between the water supply tubing 16 and a length of transport tubing 22 that projects from a base of an umbrella handle 26.

[0012] The transport tubing 22 preferably lies within an umbrella shank 28 (which is conventionally a segment of metal tubing), and extends from the umbrella handle 26 to the umbrella canopy 32. In a conventional manner, the canopy 32 consists of a

fabric or other material that is attached to and supported by a plurality of ribs 36 that extend in a spoke-like manner from an upper end of the umbrella shank 28.

[0013] The plurality of ribs 36 pivot from their attachment location on the umbrella shank 28, between a closed or stored position in which the ribs 36 are substantially parallel to the shank 28 (not shown in the drawings) to an unfurled position in which the ribs 36 are substantially perpendicular to the shank 28 when the canopy 32 is fully extended. A plurality of spreaders 38 position the canopy, with each attached to a separate one of the plurality of ribs 36 on one end and on the other, to a ring 42 that is slidably received by the shank 28. A reciprocating movement of the ring 42, up and down the shank 28, results in the opening and closing of the canopy 32. A cap button 44 is centrally positioned within the canopy 32, overlying the shank 28 to provide surface continuity at the attachment location for the ribs 36.

[0014] A water droplet mist 48 is shown in Figure 1, formed beneath the canopy 32. The underlying distributional structure required to transport the water from the water reservoir 14 and produce the mist 48 is shown in Figure 2. A distribution-tubing network 52 extends from a centrally positioned transport connector 54, and terminates in a plurality of nozzles 58.

[0015] As is best depicted in Figure 2A, the transport connector 54 attaches the distribution-tubing network 52 to the transport tubing 22, and thus to the source of water supply. One or more feeder connectors 62 (only one shown in Figure 2A) may be used to attach feeder tubing 64 to the distribution-tubing network 52 to enable the provision of additional nozzles 58 under the umbrella canopy 32.

[0016] Turning now to Figure 3, a plurality of attachment bands 68 are utilized to arrange and attach the distribution-tubing network 52 among several individual spreaders 38. Preferably, these attachment locations are substantially adjacent to the nozzles 58 to more securely position the nozzles 58, and thus provide greater directional control over the water droplet mist 48 (not shown in Figure 3). Additionally, although three nozzles 58 are depicted in Figure 3, this number can vary, depending upon a number of design factors, such as the size of the umbrella and the climate in which the umbrella will be used.

[0017] The manner of operation for the misting umbrella 10 is best explained with reference to Figure 1. Water is placed within the water reservoir 14, and pressurized using an internal pump provided for that purpose. The water supply tubing 16 is connected to the transport tubing 22 at the quick connect valve 18, making the water available to the misting umbrella 10.

[0018] Initiation of water flow can be accomplished by a valve arrangement in the quick connect valve 18, or by a separate valve (trigger, push-button, battery operated, etc.) that is attached to the umbrella itself (not shown in the drawings). Once initiated, water flows through the transport tubing 22, into the distribution tubing network 52 (identified in Figure 2), and out through one or more of the nozzles 58. While the misting nozzles 58 can be turned in many different directions, the most satisfying appears to be one that is level, or slightly pointing upward, into the canopy. As so arranged, the canopy fills with a fine water mist, which then gently floats down upon the user under the influence of gravity. Light breezes can add a pleasant swirling motion to this mist.

[0019] When utilizing a portable water reservoir, as is depicted in Figure 1, practical considerations of weight suggest the desirability of intermittent use of the misting system. However, in more permanent locations, such as patio or poolside umbrellas, a larger water supply permits more or less continuous use during hot periods of the day. Even where the water supply is limited, individual nozzles can be provided with a shut off device, permitting the user to limit the number of mist-creating nozzles where temperature conditions warrant.

[0020] When finished, the water valve is shut off and the water supply tubing 16 is disconnected from the quick connect valve 18. If there is a one-way valve feature in the quick connect valve 18, there is no leaking upon tubing separation, and a bleeding operation can empty any remaining water within the umbrella at a suitable location for disposing of the wastewater. The umbrella can then be folded in a conventional manner, and secured for storage.

[0021] In a preferred embodiment, the misting umbrella 10 makes use of an umbrella of substantially conventional design, having a canopy diameter of one to eight feet when opened, with a shank of approximately one to eight feet long. The water reservoir

holds approximately 10–100 fluid ounces, and is attached to the umbrella using a water supply tubing 16 fabricated out of a plastic or rubber material of thickness 1/8inch and of a sufficient length for the umbrella dimensions.

[0022] The transport tubing 22 may also be fabricated out of plastic or rubber, and is conveniently received within the umbrella shank 28. Such tubing has a diameter of 1/8 to 1 inch and a length as required by the distribution network required. This same tubing is preferably used for the distribution-tubing network 52, with the nozzles of a conventionally available variety having an appropriate flow rate for the desired application.

[0023] While the foregoing depicts a misting system within an umbrella, it should be appreciated that the present invention also provides a temporary water misting system for use in a variety of other locations. Such a system may be temporarily installed in a covered golf cart, the canvas or fabric roofs of Jeeps ® and other all terrain vehicles, boats, trailers, and the like. The present invention provides a misting system that is portable, removable, and extremely versatile with respect to placement locations.

[0024] Our invention has been disclosed in terms of a preferred embodiment thereof, which provides an improved misting umbrella that is of great novelty and utility. Various changes, modifications, and alterations in the teachings of the present invention may be contemplated by those skilled in the art without departing from the intended spirit and scope thereof. It is intended that the present invention encompass such changes and modifications.